

## THE GENUS PANOPEUS.

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(With Plates XIX-XXIV.)

This paper is based upon the study of twenty-four species of *Panopeus*, specimens of all of which have been examined by the authors. Fourteen other species and one variety, described by various writers, have not been seen by us; nevertheless, we give the synonymy and short descriptions. The material examined is contained chiefly in the National Museum, and has been derived from the following sources: The large collections made by Mr. Henry Hemphill on the coast of Florida from 1883 to 1885; the collections of the U. S. Fish Commission from the coasts of the Eastern States from 1875 to date, including those made in the investigation of the oyster grounds of Long Island Sound; the Fish Commission collections made in the net-work of rivers and creeks of the coast of South Carolina during the past season, in the West Indian region in 1884, and in the Gulf of California; the smaller collections made by Dr. Edward Palmer, Lieut. J. F. Moser, U. S. Navy, Dr. D. S. Jordan, Mr. W. H. Dall, Mr. Silas Stearns, and Mr. S. T. Walker, on the Florida coast; by Commander R. D. Evans, U. S. Navy, in Chesapeake Bay; by Mr. W. Nye, jr., in Buzzard's Bay; by Mr. W. M. Gabb, in San Domingo; by Mr. L. Belding, in the Gulf of California; by Mr. R. Rathbun, on the coast of Brazil, in 1875-'76; by Mr. G. Brown Goode, in Bermuda, 1876-'77. Through the courtesy of Prof. A. E. Verrill, the collection of *Panopeus* in the Peabody Museum of Yale University, was placed at our service, and yielded three species additional to those represented in the National Museum series.

We do not agree with Prof. A. Milne Edwards in his separation of the genus into *Panopeus* and *Eurypanopeus*, for in accepting his classification *depressus* would be placed with forms having a lobate division of the antero-lateral margin; *crenatus* and *transversus*, with very convex carapaces, would be placed with those most flattened; and *crenatus* alone of *Eurypanopeus* would possess the character of the exposed seventh segment of the male sternum, and the sternal canal for the verges. Nor can we agree with Stimpson in separating *Eurytium* from

*Panopeus*, as the exposure of the seventh sternal segment varies with the species, as does the size of the palatal ridge. The two species which have been placed in *Eurytium* have but little in common, except the two rounded lobes of the front. It would seem that if a division of the genus *Panopeus* should eventually be made, it must be on other lines and more definite characters. It can hardly be said that we have extended the limits of a genus which already contains *Panopeus herbstii* and *P. harrisii*.

The genus is American with the exception of one species from the west coast of Africa and two from the Indo-Pacific region.

The first species was described and figured by Thomas Say, in Jour. Acad. Nat. Sci. Phila., 1, 1817, under the name of *Cancer panope* Herbst, to which species he had mistakenly referred it. Milne Edwards, in his classical work published in 1834, established the genus *Panopeus*, and under the name of *P. herbstii* entered as synonyms *Cancer panope* Herbst and *C. panope* Say, believing them to be one and the same species, thus continuing the mistake of Say, which has been followed by numerous authors. Prof. S. I. Smith, in the Proc. Boston Soc. Nat. Hist., XII, 1869, points out the error, and in 1872 Prof. von Martens in the Arch. für Natur., 38, refers to the original specimen of *Cancer panope* Herbst in the Berlin Museum as a *Menippe*, thus confirming the view taken by Professor Smith.

In the waters of Long Island Sound the indigenous species are found abounding on the oyster beds, very often in the dead shells of oysters and other lamellibranchs when the valves remain together and partly open. They move slowly and clumsily, and no doubt remain for long periods in the same place of concealment, watching for food to come to them. Farther south they are found near high-tide mark in holes in the banks along with *Gelasimus* and *Sesarma*. In deeper water they live among sponges, corals, dead shells, and clusters of oysters, or in any object that will afford concealment. Many of the species are not easily distinguished and only careful comparison will acquaint one with them. We have examined over three thousand specimens belonging to the different species which we have referred to *Panopeus*.

In the following descriptions the antero lateral teeth are designated as first, second, third, and fourth. The first is the tooth next the outer angle of the orbit, and the fourth is the posterior tooth.

The numbers in parentheses after the names of localities are taken from the catalogue books of the National Museum. Wherever it was impossible to verify the synonymy, we have placed the quotation in parentheses.

#### GENUS *PANOPEUS* Milne Edwards.

*Cancer*. Thomas Say, Jour. Acad. Nat. Sci. Phila., 1, p. 57, 1817.

*Panopeus*. Milne Edwards, Hist. Nat. des Crust., 1, p. 403, 1834. J. E. DeKay, Crust. of N. Y., p. 5, 1844. Gay, Historia de Chile, Zoöl., III, p. 138, 1849. H. Lucas, Hist. Nat. des Crust., p. 89, 1851. J. D. Dana, Crust. U. S. Ex. Ex., pp. 149, 179, 1852.

H. de Saussure, Mém. Soc. Phys. Genève, xiv, p. 431, 1857. W. Stimpson, Ann. Lye. Nat. Hist. N. Y., vii, p. 54, 1859. S. I. Smith, Proc. Boston Soc. Nat. Hist., xii, p. 275, 1869. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, 1, p. 306, 1880. W. A. Haswell, Cat. Australian Crust., p. 51, 1882. H. W. Conn, Stud. Biol. Lab. Johns Hopkins Univ., iii, No. 1, pp. 4-9, figs., 1884. E. J. Miers, Challenger Rept., Zool., xvii, p. 128, 1886.

*Eurytium*. W. Stimpson, *Loc. cit.*, p. 56. A. Milne Edwards, *Loc. cit.*, p. 332. E. J. Miers, *Loc. cit.*, p. 140.

*Eurypanopeus*. A. Milne Edwards, *Loc. cit.*, p. 318.

Orbit interrupted by an external hiatus, below entire. Antero-lateral margin thin, often shorter than the postero-lateral and directed toward the external angle of the orbit. (Dana, *loc. cit.*, p. 149.)

#### ARTIFICIAL KEY TO SPECIES EXAMINED.

A'. Antero-lateral border cut into teeth.

B'. Dactyl of large hand with a large basal tooth.

C'. Carpal groove present.

D'. Fingers light.

E'. Outline of male abdomen slightly concave, terminal segment rounded ..... *bermudensis*

E''. Outline of male abdomen very concave, terminal segment pointed ..... *hemphillii*

D''. Fingers dark.

E'. Carpus smooth or nearly so.

F'. Seventh sternal plate in male exposed ..... *angustifrons*

F''. Seventh sternal plate in male not exposed.

G'. Front faintly four-lobed ..... *occidentalis*

G''. Front produced, much rounded ..... *packardii*

E''. Carpus rugose.

F'. Antero-lateral teeth thickened vertically ..... *harttii*

F''. Antero lateral teeth thin ..... *serratus*

D'''. Fingers variable. Front grooved ..... *wurdemannii*

C''. Carpal groove wanting or indistinct.

D'. Anterior margins of antero-lateral teeth nearly perpendicular to the median line. Front thickened, truncate ..... *areolatus*

D''. Antero-lateral teeth pointing slightly forward. Front beveled ..... *herbstii*

D'''. Antero-lateral teeth strongly hooked forward ..... *validus*

B''. Dactyl of large hand without a large basal tooth.

C'. Male abdomen with five segments.

D'. Terminal segment triangular.

E'. Fingers black ..... *sayi*

E''. Fingers white ..... *texanus*

D''. Terminal segment rounded.

E'. Fingers black ..... *depressus*

E''. Fingers white ..... *harrisii*

C''. Male abdomen with six segments ..... *dissimilis*

A''. Antero-lateral border cut into dentiform lobes.

B'. Carapace convex.

C'. Seventh segment of sternum exposed, separating the third segment of abdomen from the coxæ of the fifth pair of feet.

D'. Front with two well-rounded lobes ..... *limosus*

D''. Front with margins of lobes straight or nearly so ..... *crenatus*

C''. Seventh segment of sternum not exposed ..... *transversus*



A''. Antero-lateral border cut into dentiform lobes—Continued.

B''. Carapace flattened.

C'. Carpal groove present.

D. Outline of coalesced tooth convex.....*oratus*

D''. Outline of coalesced tooth emarginate.....*parrulus*

D'''. Outline of coalesced tooth emarginate. Carapace absolutely flat.

*planissimus*

C''. Carpal groove wanting.

D'. Color of finger running up on hand.....*planns*

D''. Color restricted.....*affinis*

Note.—*Hemphillii*, *packardii*, *harttii*, and *wurdemannii* occasionally lack the large tooth on the dactyl.

# 1. *Panopeus herbstii* Milne Edwards.

Plate XIX, figs. 1 and 2; plate XXIII, figs. 10-12.

*Cancer panope*. Thomas Say, Jour. Acad. Nat. Sci. Phila., 1, pp. 58, 447, pl. 4, fig. 3, 1817.

*Panopeus herbstii*. Milne Edwards, Hist. Nat. des Crust., 1, p. 403, 1834. J. E. De Kay, Crust. of N. Y., p. 5, 1844. Lewis R. Gibbes, Proc. Boston Soc. Nat. Hist., 2, pp. 63, 69, 1845; Proc. Acad. Nat. Sci. Phila. v, p. 23, 1850; Proc. Amer. Assoc. Adv. Sci., 3, p. 175, 1850. Adam White, Crust. in Brit. Mus., p. 18, 1847. H. Lucas, Hist. Nat. des Crust., p. 90, 1851. Joseph Leidy, Jour. Acad. Nat. Sci. Phila. (2), III, p. 17, 1855. W. Stimpson, Amer. Jour. Sci. (2), 29, p. 444, 1860. Camil Heller, Reise Fregatte Novara, Bd. 2, Abth. 3, p. 16, (1864) 1868. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 276, 1869; Trans. Conn. Acad., II, p. 34, 1869; Rept. U. S. Commr. Fisheries for 1871-'72 (1874), pp. 547, 472. Elliott Cones, Proc. Acad. Nat. Sci. Phila. (3), 1, p. 120, 1871. E. von Martens, Arch für Natur., 38, p. 89, 1872. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 318, 1878; XXXI, p. 393, 1879. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, 1, p. 308, pl. LVII, fig. 2, 1881; Bull. Mus. Comp. Zool., VIII, p. 13, 1880. R. Rathbun, Fishery Industries of U. S., section I, p. 772, 1884. Carl F. Gissler, Amer. Nat., XVIII, p. 225, 1884. B. Ozorio, Jor. Sci. Lisbon, p. 190, 1888.

*Panopeus lacustris*. Desbonne et Schramm, Crustacés de la Guadeloupe, (p. 28), 1867.

*Panopeus herbstii* var. *obesus*. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 278, 1869. Elliott Cones, Proc. Acad. Nat. Sci. Phila. (3), 1, p. 120, 1871. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 318, 1878. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, 1, p. 309, 1880.

Numerous lots of this species ranging from Rhode Island to Key West, Florida, along the Gulf coast to Louisiana, and along the coast of South America to Brazil, including a number of the West Indian islands, show remarkable variation in form. For our own convenience in the study of the species, we divided them into six varieties according to the prominence and direction of the antero-lateral teeth. In the specimens placed at one extreme of the series, var. G, the teeth are blunt, directed forward, exterior edge rounded or arcuate, the second and third broad at the base. Posterior lobe of coalesced tooth broad and rounded, anterior lobe angular. In the specimens placed at the other extreme of the series, var. B, the antero-lateral teeth are sharp-pointed and project forward and outward. The notches between them are broader than in var. G, making the bases of the teeth narrower. The coalesced tooth in this variety is more deeply cut into two angular



lobes of nearly equal prominence, giving the antero-lateral border more the appearance of being five-toothed. The inner suborbital angle is much sharper in this variety. In var. G the carapace is more convex, the front is less produced, and the contour has a more evenly rounded appearance. In var. B the carapace has a more uneven appearance, the punctures and markings are deeper and coarser. The other characters are variable and cross and recross the convenient division made on the basis of the teeth. As a rule, var. G is proportionately broader than var. B while the latter is more hairy. In var. G the color does not extend quite so far upon the hand, and runs from a black to a brown, while in var. B it runs from a black to a liver color. It is worthy of notice that in some specimens from the West Indies and Brazil the color of the fingers is more or less restricted. In var. B the tooth on the large hand at the base of the movable finger is larger and more conspicuous than in var. G. In no instance is there a groove on the carpus next the articulation with the hand.

We have a great many specimens from Port Royal Island, South Carolina, taken in the banks near high tide mark. The burrows or holes in which these crabs were concealed did not as a rule contain water, while the specimens of *limosus*, taken at the same time, were in burrows partly filled with water. These specimens of *herbstii* are of the var. G or *obesus* type. The chelipeds are spotted with claret brown, and crossed by irregular lines, giving them a reticulate appearance (Pl. XXIII, fig. 11). The chelipeds are more slender than those of the sharp-toothed or B type (Pl. XXIII, fig. 10), which were found on Morgan River, Jericho Creek, and other places at low tide on bunches of oysters. The conclusion reached from the study of the collections from South Carolina is that the varying habit of this crab accounts for its wide differentiation in form. Those living in burrows are the *obesus* type, while the sharper-toothed forms are dredged or found in low water in various hiding places. From our present knowledge, however, we see no way of dividing the species, as our collections show every intermediate gradation.

*Panopeus herbstii* belongs to the section of the genus in which the seventh segment of the sternum in the male is but slightly exposed, and leaves a wide open passage for the verges. Proximal end of second segment much the broader. The fifth pair of feet border broadly on the third abdominal segment. In the anchylosed segment the sides of the third normal segment are nearly straight, slightly swollen in the center. Sides of the fourth normal slightly concave. Proximal end of the fifth normal the broader, sides nearly straight. Penultimate segment with straight and parallel sides. Terminal segment rounded. General outline of last three normal segments not concave but parallel.

Length of carapace in largest specimen, 40 millimetres; width, 62 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Newport, Rhode Island; U. S. Fish Commission (4539).

South Carolina: U. S. Fish Commission, 1890-1891: Winyah Bay (15687); Oyster Bay (15730); Old Man Creek (15741); Bulls Bay (15775); Morgan River (15780); Myrtle Bush Creek (15772); Jericho Creek (15782); Cat Island Creek (15779); Port Royal Island (15768, 15784); near Port Royal (15726); Paris Island, Broad River (15742); mouth of Bull Creek (15722); Calibogue Sound (15737).

Florida: St. Augustine (Yale Univ. Mus.); mouth of Indian River (Yale Univ. Mus.); near Indian Key (15018, 15423); Key Vacas (14071); Big Pine Key (15014); Key West (9296); South Florida (15415); Garden Key (2077); ? Dry Tortugas (9294); Marco (15017); Oyster Bay (15013); Ferguson's Pass (15419); Punta Rassa (6438); Sarasota Bay (6425); Palma Sola, mouth of Manatee River (6433); Egmont Key (Yale Univ. Mus.); Tampa Bay (15407); near Piney Point (6962); Goodland Point (6985); Boca Ceiga Bay, inner shore of Pine Key (6447); Clearwater (3277); Cedar Keys (6982); Pensacola (3466); West Florida, Kaiser and Martin (6702).

Grand Isle, near New Orleans, Louisiana; G. Kohn (2256).

Bermudas: G. Brown Goode, 1876-1877.

Caribbean Sea: Jamaica (15654); Aspinwall (Yale Univ. Mus.); Sabanilla, U. S. C. (7562); Curaçao (7585); Trinidad (7640).

Maranhão, Brazil; Derby and Wilmot, Hartt Explorations, 1870 (Yale Univ. Mus.).

2. *Panopeus occidentalis* Saussure.

(Plate XX, fig. 3; plate XXIII, fig. 14.)

*Panopeus occidentalis*. H. de Saussure, Rev. et Mag. de Zoöl. (2), 9, p. 502, 1857; Mém. Soc. Phys. Genève, XIV, p. 431, pl. 1, fig. 6, 1857. W. S[timpson], Amer. Jour. Sci. (2), 27, p. 446, 1859; S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 279, 1869. E. v. Martens, Arch. für Natur., 38, p. 90, 1872. A. M. Edwards, Miss. Sci. au Mexique, pt. 5, 1, p. 310, 1880; Bull. Mus. Comp. Zoöl., VIII, p. 13, 1880.

Carapace convex in both directions, covered with minute granules interspersed with punctures of much larger size. In some specimens there are a few transverse lines composed of larger granules. Regions fairly distinct, depressions slight, and occasionally in part obliterated. Antero-lateral teeth slightly elevated, anterior margins truncate. The three posterior teeth are pointed. First tooth separated from the post-ocular tooth by a rather deep sinus, which, however, does not divide the coalesced tooth to its base.

Front produced, thin, slightly depressed, with a median fissure, each lobe slightly emarginate, giving the front a somewhat four-lobed appearance. Median lobes more produced; lateral lobes faint.

Space between the two fissures of the upper orbital margin slightly rounded, interrupting the regular curve of the orbit. External hiatus widely V-shaped and deep. The inner suborbital angle forms a prominent tooth. A rather deep sinus divides this from the lobe which reaches to the external fissure. Lower orbital margin produced.

Abdomen of the male wider than in *herbstii*, outline concave, penultimate segment widest at its distal end. Coxæ of fifth pair of feet in broad contact with third abdominal segment. Seventh segment of sternum shows but little.

The marginal depression on the carpus near the articulation with the hand is wide and deep. In some specimens the carpus is finely granulate; in others the granules are thrown up in slight rugæ. The hand varies in much the same way: in some specimens finely granulate; in others, thrown up in rugæ as in the carpus. In the latter case the hand is always much smoother than the carpus in the same specimen. Fingers brown or horn color, shading to clear white at the tips. There is a large tooth at the base of the dactyl of the large hand. There is also a more or less prominent tooth on the large hand at the base of the dactyl. The color on the immovable finger does not extend beyond the line of color on the movable finger; while in *herbstii* it usually extends considerably beyond. Meros of ambulatory feet more slender and a little longer than in specimens of *herbstii* of the same size. Ambulatory feet slightly hairy.

The most of our specimens are readily separated from *herbstii* by the color, which, in alcohol, is very much lighter, with a pinkish tinge on the chelipeds. This separation is confirmed by the prominent depression on the carpus near the articulation with the hand, of which there exists scarcely a trace in *herbstii*.

Length of carapace in large specimen, 20 millimetres; width, 27.5 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

South Carolina; U. S. Fish Commission, 1891: Calibogue Sound (15713, 15716).

Florida: Carysfort Reef (9297); Indian Key (15418); No Name Key (15015); Key West (14445, 15424); South Florida (3464); Mareo (15427); Goodland Point (15426); Boca Ceiga Bay, inner shore of Pine Key (15425).

Caribbean Sea; U. S. Fish Commission, 1884: Jamaica (7678); Old Providence (9135); Sabanilla, U. S. C. (15656); Curaçao (7588); Trinidad (15657).

#### 3. *Panopeus areolatus*, sp. nov.

(Plate XXI, fig. 3.)

This species in its shape and proportion is most nearly related to *herbstii*, in its antero-lateral teeth to *angustifrons* and *bermudensis*. Carapace more flattened than in *herbstii*, antero-lateral teeth slightly upturned, the posterior three much more triangular than in *herbstii*. Areolations of the carapace very distinct in the young as well as the adult. In the younger forms the granules of the anterior portion are arranged in more marked lines than in the older.

Front narrower and slightly more produced in the middle than in *herbstii*. External lobes well marked and slightly produced; front thickened, readily distinguishing this species from *herbstii*; upper and lower edges granulate; the intermediate space is occupied by large granules and by some irregular spaces without granules.

Coalesced tooth unevenly divided into two parts by a sulcus which cuts it about one-third the way to the base. Posterior portion larger and rounded, anterior pointed. Anterior margin of second tooth trun-



cate. Third tooth much the largest, broadly triangular, its anterior margin nearly perpendicular to the median line of the carapace. Fourth tooth triangular, anterior margin sloping backwards to the tip.

External hiatus of the orbit broad and rounded at the base, in the smaller specimens more V-shaped. Sub-hepatic tubercle present.

Seventh segment of the sternum in the male very slightly if at all exposed. Coxæ of fifth pair of feet in contact with third abdominal segment. In the anchylosed segment the outline of the third normal segment is rather angular. Outline of the fourth normal concave and of the fifth normal convex. Terminal segment somewhat triangular, rounded at the tip. Penultimate segment widest at its distal end, while in *herbstii* the segment is of the same width throughout its length. The very different arrangement of the second and third segments distinguishes this species from *bermudensis*. A comparison of the appendages of the male abdomen shows it to be widely separated from *herbstii*.

Chelipeds very much like those of *herbstii*. Lower margin of large hand a little straighter, and in some specimens convex. Hand a little deeper than in *herbstii*, movable finger slender and strongly arched, making a conspicuous gape in all the specimens from the largest to the smallest. Cylindrical tooth at the base of the movable finger long. Tooth on the manus less conspicuous than in *herbstii*. Dactyls of ambulatory feet hairy. There are a few hairs on the propodal joints.

Length of carapace in large specimen, 21.5 millimetres; width, 27.5 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

Caribbean Sea: Jamaica (7783); St. Thomas (Yale Univ. Mus.); Aspinwall (Yale Univ. Mus.); Sabanilla, U. S. C. (15646).

Brazil: Hartt Explorations: Maranhão; Plataforma, Bahia; Bom Fim, Bahia.

#### 4. *Panopeus validus* Smith.

(Plate XIX, fig. 3; plate XXIII, fig. 13.)

*Panopeus validus*. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 278, 1869; Ann. Rept. Peabody Acad. Sci., 3, p. 89, 1870. W. N. Lockington, Proc. Cal. Acad. Sci., VII, p. 102, 1876. J. S. Kingsley, Proc. Boston Soc. Nat. Hist., XX, p. 152, 1879.

"? *Panopeus chilensis*." A. M. Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 315, 1880.

Front divided by a closed fissure, the outer end of which rounds out into the lobes. In some specimens the posterior lobe of the coalesced tooth is produced forward to the same line as the anterior. Posterior lobe larger and more conspicuous than the anterior. Male abdomen much as in *herbstii*. Seventh segment of sternum very slightly exposed.

Length of carapace in large specimen, 34 millimetres; width, 48 millimetres.

The specimens which we have examined are distinct from *P. chilensis* as figured by Edwards and Lucas in d'Orbigny's Voy. l'Amér. Mérid., 1843, pl. VIII, fig. 2, and with our present knowledge we do not feel warranted in uniting the two species.

## RECORD OF SPECIMENS EXAMINED.

Acajutla, San Salvador (Yale Univ. Mus.).  
Bay of Panama (Yale Univ. Mus.).  
Locality unknown (13930).

5. *Panopeus texanus* Stimpson.

(Plate XXII, fig. 5; plate XXIII, fig. 9.)

*Panopeus texanus*. W. Stimpson Ann. Lyc. Nat. Hist., VII, p. 55, 1859. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., XXXI, p. 394, 1879 (partim). A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 312, pl. LVIII, fig. 4, 1880 (partim).

Carapace very convex in both directions, widest at the posterior teeth, and minutely pubescent, especially in the females. Front slightly produced and rounded. Coalesced tooth with a very shallow sinus. Second and third teeth sharp, and pointing forward and upward. Posterior tooth short and sharp, the tip directed forward. Male abdomen very broad, lateral outline markedly concave, terminal segment much flattened.

Chelipeds smooth and glabrous. The movable finger is a light horn color. The immovable finger is white in the male, the color extending to the hand and terminating in a very distinct line, which begins at the base of the finger at the gape and rounds backward to the lower margin. In the females the color is a little darker. There is no large tooth or tubercle at the base of the dactyl or on the anterior outer margin of the manus. Ambulatory feet long and slender.

Length of carapace in large specimen, 17 millimetres; width, 22.5 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Florida: Mouth of Indian River (Yale Univ. Mus.); Marco (15384); Punta Rassa (6653, 14082); Charlotte Harbor (14089); Sarasota Bay (6426, 6975); Palma Sola, mouth of Manatee River (15383); Egmont Key (Yale Univ. Mus.); Tampa Bay (15385); Goodland Point (15631); Boca Ceiga Bay, inner shore of Pine Key (15382); Orange Bluff, Clearwater Harbor (6968); Cedar Keys (6415, 15386).

6. *Panopeus sayi* Smith.

(Plate XXII, fig. 4; plate XXIII, figs. 7 and 8.)

*Cancer panope* (pars). Thomas Say, Jour. Acad. Nat. Sci. Phila., I, pp. 58, 447, 1817.

*Panopeus sayi*. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 284, 1869; Rept. Commr. of Fisheries for 1871 and 1872 (1874), pp. 547, 312; Trans. Conn. Acad., V, p. 37, 1879. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 319, 1878. A. E. Verrill, Check-List of Marine Invert., p. 1, 1879. R. Rathbun, Proc. U. S. Nat. Mus., 3, p. 119, 1880; Fishery Industries of U. S., section I, p. 772, 1884. Walter Faxon, Bull. Mus. Comp. Zool., 6, p. 165, pl. II, 1880. E. A. Birge, Studies Biol. Lab. Johns Hopkins Univ., II, No. 4, pp. 411-426, pls. XXX-XXXIII, 1883. Carl F. Gissler, Amer. Nat., XVIII, p. 225, 1884.

*Panopeus texanus*. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., XXXI, p. 394, 1879 (partim). A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 312, pl. LVIII, fig. 4, 1880 (partim).

*Panopeus sayi* is so closely related to *texanus* that any description is necessarily comparative. The frontal margin of *sayi* is depressed, while that of *texanus* is horizontal or nearly so. In specimens of equal size the abdomen is narrower at the terminal segment in *sayi*, and the constriction at the articulation of the anebylosed and penultimate segments is less in *sayi*. With a little experience one could separate the two species on the character of the surface of the chelipeds. In many specimens of *sayi* the chelipeds are marked with irregular lines of color corresponding to very small oblong depressions between which the surface is minutely granulated and scattered with punctures. The chelipeds of *texanus* are covered with very minute granules and with thinly scattered punctures. To the naked eye the surface appears glabrous. In *sayi* the color of the fingers in the male ranges from black to horn color, and runs up on the hand both inside and out to a variable extent (Pl. XXIII, figs. 7 and 8). In the females the fingers are horn color, which is often restricted, much as in *texanus*, but in this species the females can readily be distinguished by the antero-lateral teeth, which are sharper and more produced. The ambulatory feet are relatively much shorter in *sayi* than in *texanus*. This is most noticeable in comparing the dactyls of the fourth and fifth pairs of feet (Pl. XXII, figs. 4 and 5).

Length of carapace in large specimen, 17 millimetres; width, 22.5 millimetres.

After a critical examination of over five hundred specimens of *sayi* and over two hundred and fifty of *texanus* we regard the two species as altogether distinct, as they can be separated by several different characters. On the coast of South Carolina, a region intermediate between Cape Cod, the well-known habitat of *sayi*, and the Florida coast, where all our specimens of *texanus* were obtained, large numbers of *Panopeus* have recently been collected, none of which present any gradations between *sayi* and *texanus*, but all are identical with the northern form.

#### RECORD OF SPECIMENS EXAMINED.

Massachusetts: Wellfleet (3001); Provincetown (3005, 3827); off Falmouth (13843); Vineyard Sound, low water to 9 fathoms; Wood's Holl (3214, 15662); Buzzard's Bay, 5 to 8 fathoms; Mattapoissett Harbor (5782).

Long Island Sound, U. S. Fish Commission: Gardiner's Bay (15752); New Haven Harbor, on oyster beds (4162); off Milford, Stratford, and Bridgeport, on oyster beds.

New Jersey: Beesley's Point (Yale Univ. Mus.).

Virginia: Mouth of Indian River, Chesapeake Bay, on iron buoy (15618); York River, Chesapeake Bay, on wooden buoy (13847); Hampton Roads, 12 fathoms (12453).

North Carolina: Fort Macon (Yale Univ. Mus.).

South Carolina, U. S. Fish Commission, 1890-1891: Winyah Bay (15689); Clam-bank Creek (15703); Bulls Bay (15777); Coosaw River (15771); Myrtle Bush Creek (15769); Jericho Creek (15783); near Port Royal (15729); one mile inside of May River (15731); west end of Skull Creek (15738); Bull Creek (15721, 15734); Calibogue Sound (15773).



7. *Panopeus packardii* Kingsley.

(Plate XXII, fig. 1; plate XXIII, fig. 6.)

*Panopeus packardii*. J. S. Kingsley, Proc. Boston Soc. Nat. Hist., xx, p. 152, 1879; Proc. Acad. Nat. Sci. Phila., xxxi, p. 394, 1879. E. J. Miers, Challenger Rept., Zool., xvii, p. 129, 1886.

Carapace much swollen. Front slightly bilobed, produced, and very much rounded in an even curve with the coalesced post-ocular and first tooth. The swollen carapace and produced front give it a strong resemblance to *texanus*.

Antero-lateral teeth sharper and more produced than in *texanus*. Post-ocular tooth so far coalesced with the first antero-lateral tooth as to show a scarcely perceptible emargination. The second and fourth teeth point at right angles to each other, while the third points in an intermediate direction.

Seventh segment of male sternum not at all exposed. In the anchylosed segment the third normal segment is rather narrow, its margin is rounded, and it borders on the coxæ only at the articulation. Outline of fourth normal segment concave, of the fifth more nearly straight. Penultimate short. Terminal segment short and rounded.

Fingers of the chelipeds black with white tips, varying in some specimens to light brown with white tips. The color runs up on the hand at the lower margin. Movable finger of large cheliped has a large tooth at its base. Tooth on the manus at the base of the movable finger often not well developed. Now and then an individual will be found in which both chelipeds have the character of the usual small cheliped, with no large tooth on the dactyl and no tooth on the hand at the base of the dactyl. These variations do not connect this species with any other when all the characters are considered. Carpal tooth sharp.

The antero lateral teeth, the more rounding front, the very different shape of the abdomen, and the tooth at the base of the finger separate this species from *texanus* and *sayi*.

Length of carapace in large specimen, 13 millimetres; width, 18 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Florida: Cards Sound (15225); Key Largo (15392); No Name Key (13546); Key West (15390, 15395); Marco (15633); Punta Rassa (15394); Charlotte Harbor (15389, 15393); Sarasota Bay (6430); Boca Ceiga Bay, inner shore of Pine Key (15396); Orange Bluff, Clearwater Harbor (15391); off northwest end St. Martin's Reef (13042); Cedar Keys (15397); Sea Horse Key (13051).

8. *Panopeus depressus* Smith.

(Plate xx, fig. 5; plate xxiii, figs. 4 and 5.)

*Panopeus depressus*. S. I. Smith, Proc. Boston Soc. Nat. Hist., xii, p. 283, 1869; Rept. U. S. Commr. of Fisheries for 1871 and 1872 (1874), pp. 547, 312, pl. i, fig. 3; Trans. Conn. Acad., v, p. 37, 1879. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 319, 1878; xxxi, p. 394, 1879. P. R. Uhler, Sci. Results, Chesapeake Zool. Lab. for 1878 (1879), p. 25. A. E. Verrill, Check-List of Marine Invert., p. 1, 1879. R. Rathbun, Proc. U. S. Nat. Mus., 3, p. 119, 1880; Fishery Industries of U. S., section i, p. 772, pl. 269, fig. 3, 1884. J. H. Emerton, Life on the Seashore, p. 40, fig. 42, 1880. Carl F. Gissler, Amer. Nat., xviii, p. 225, 1884.

*Eurypanopeus depressus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, i, p. 320, pl. LIX, fig. 2, 1880.

*Panopeus depressus* is readily distinguished from *dissimilis* by having the male abdomen composed of five segments instead of six. It is distinguished from all other species by the flattened carapace with transverse granulate rugæ, the nearly straight front, and the prominent semi-spoon-shaped fingers of the small hand, and occasionally of the large, in connection with the black or dark brown color of the fingers, the color running up on the hand far behind the gape of the claw.

Margin of second segment of male abdomen concave. Coxæ of fifth pair of feet in contact with third segment.

Length of carapace in large specimen, 14 millimetres; width, 19.5 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Vineyard Sound, Massachusetts; U. S. Fish Commission (14799).

Beesley's Point, New Jersey (Yale Univ. Mus.).

Virginia: Smith's Creek, Potomac River, on wooden buoy (13845); mouth of Indian Creek, on iron buoy (13929); Chesapeake Bay, 9½ to 20 fathoms (13793); Pankatauk River, on iron buoy (13848); York River, on wooden buoy (15403).

South Carolina; U. S. Fish Commission: Winyah Bay (15683, 15688); near inlet, Jones Creek (15685); upper mouth Clambank Creek (15702); Bulls Bay (15776); Charleston Harbor (4065); Morgan River (15781); Jericho Creek (15785); near Port Royal (15727).

Florida: Mouth of Indian River (Yale Univ. Mus.); Cape Florida (13899); Garden Key (2292); Oyster Bay (6990); Ferguson's Pass, Oyster Bay (6981); Punta Rassa (6665); Sarasota Bay (15400); Palma Sola, mouth of Manatee River (15401); Egmont Key (Yale Univ. Mus.); Tampa Bay, near Piney Point (15399); Goodland Point (15398); Clearwater (3278); Cedar Keys (6418).

9. *Panopeus dissimilis*, sp. nov.

(Plate xx, fig. 4; plate xxiii, fig. 1.)

Carapace convex in both directions, crossed by lines of granules very much as in *depressus*. Gastric regions little elevated.

Front horizontal, little produced, nearly straight, not at all four-lobed; median notch slight; edge thin, studded with fine granules.

Orbit with two fissures above, the interspace a little produced; upper and lower margins set with a single row of granules, which are continued along the margin of the antero-lateral teeth.

Anterior portion of coalesced tooth conical, short; posterior portion

rounded and long. Anterior edge of second tooth straight, the point hooked forward, posterior edge rounding. Anterior edge of third tooth curved forward to a point. Posterior edge long and not so much rounded as that of the second tooth. Last tooth small, sharp, point projecting forward. In general appearance the antero-lateral teeth are much like those of *depressus*, but cut much deeper and more strongly hooked forward.

External hiatus of orbit a deep-cut triangular notch. Subhepatic and subbranchial regions closely set with flattened depressed granules. As in *depressus*, the subhepatic tubercle is wanting.

Sides of second segment of male abdomen concave. Coxæ of fifth pair of feet broadly in contact with third segment of abdomen. Third segment entirely free, its sides nearly straight. Fourth and fifth normal segments anchylosed, their sides concave, the fourth broadest at its proximal end. Penultimate segment short, its sides slightly concave. Terminal segment rounded.

Chelipeds very unequal. Carpus of the larger cheliped finely granulated on its inner and upper portions, slightly rugose on its outer portion. Carpus of the smaller cheliped more coarsely rugose and granulate than that of the larger. Carpal tooth very sharp, shaped like that of *depressus*. Larger manus minutely granulate, swollen, deep. Fingers very short, gaping, unarmed. Smaller hand coarsely granulated, with one or two longitudinal lines on the exterior surface, and with a double crest above, the intervening sulcus deeper than usual in the genus. A line of granules extends along the upper margin of the movable finger nearly to the tip. Fingers partially spoon-shaped, as in *depressus*; impressed lines deep. Ambulatory feet like those of *depressus*, except that they are set with thinly scattered hairs.

Notwithstanding the fact that, in the twenty males examined, the abdomen has six segments, we place this species in the genus *Panopeus*, as it has the character of the external hiatus of the orbit, the teeth of the antero-lateral margin are those of *Panopeus*, the appendages of the male abdomen are characteristic of many species of the genus and not very unlike those of *depressus*. The whole make-up is so closely like that of *depressus* that it takes a second look to distinguish it.

Length of carapace in large specimen, 12 millimetres; width, 17 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

Trinidad; U. S. Fish Commission, 1884 (15640).

Vigia, Brazil; Derby and Powers, Hartt Explorations, 1870 (Yale Univ. Mus.)

#### 10. *Panopeus transversus* Stimpson.

(Plate XXII, fig. 2; plate XXIV, fig. 9.)

*Panopeus transversus*. W. Stimpson, Ann. Lyc. Nat. Hist., VII, p. 210, 1860. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 282, 1869; Trans. Conn. Acad., II, p. 4, 1869; Ann. Rept. Peabody Acad. Sci., 3, p. 89, 1870.

*Eurypanopeus transversus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 319, pl. LIX, fig. 1, 1880.



It is distinguished from all other species which we have seen, by the convex carapace in connection with the lobate teeth and the contact of the coxæ of the fifth pair of feet with the third abdominal segment.

The specimens examined are from Acajutla, San Salvador, F. H. Bradley (Yale Univ. Mus.).

Length of carapace in large specimen, 12 millimetres; width, 18 millimetres

11. *Panopeus ovatus*, sp. nov.

(Plate XXIV, fig. 8.)

We have designated under this name nine small specimens of *Panopeus* from Concepcion Bay, Gulf of California, collected by the U. S. Fish Commission steamer *Albatross*, March, 1889 (15786). Carapace sub-oval, areolations fairly distinct, not protuberant. Anterior and antero-lateral portions of carapace granulated, the granules not evenly scattered over the surface, but thrown into bunches and rugæ. Lines from the notches between the antero-lateral teeth run up on the carapace, that from the second separating the hepatic and branchial regions and ending in a rounded depression. Groove between the cardiac and mesogastric regions conspicuous.

Front divided by a very slight notch, beveled, the beveled edge covered with granules. Wide median lobes very little produced, slightly rounded. Lateral lobes projecting as small blunt teeth.

The regular curve of the orbit is broken by two fissures, the space between which is straight or often a little produced.

Margin of coalesced tooth either straight or a little convex. Outline of the next two teeth nearly straight. Last tooth small, triangular and obtuse. The notches between the antero-lateral teeth are deeper and more widely gaping than in *transversus*.

Seventh sternal segment in the male entirely covered by second segment of abdomen. Outline of abdomen straight or very slightly concave. Terminal segment rounded.

Carpus granulate, carpal groove very short. Inner angle of the carpus not produced, there being but a trace of a tooth. Fingers arched and hooked at the tips, leaving a slight gape. Dactyl of the larger cheliped armed with a very small tooth near its base. Fingers of small hand marked with longitudinal impressed striæ. Prehensile edges armed with small irregular teeth.

This species is closely allied to *transversus*, but is easily distinguished by the areolated, granulated, and more flattened carapace, and by the wider notches between the teeth of the antero-lateral margin.

Length of carapace in large specimen, 8 millimetres; width, 12 millimetres.

12. *Panopeus parvulus* (Fabricius).

(Plate XXI, fig. 1; plate XXIII, figs. 2 and 3.)

*Cancer parvulus*. Fabricius, Entomologia Systematica, II, p. 451, 1793.*Xantho parvulus*. Milne Edwards, Hist. Nat. des Crust., 1, p. 395, 1834. J. D. Dana, Crust. U. S. Ex. Ex., 1, p. 170, 1852.? *Panopeus politus*. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 282, 1869; Trans. Conn. Acad., II, pp. 3, 34, pl. I, fig. 4, 1869; Amer. Jour. Sci. (2), 48, p. 389, 1869.*Eurypanopeus parvulus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 322, pl. LIX, fig. 5, 1880.? *Eurypanopeus politus*. A. Milne Edwards, Loc. cit., p. 323.

We have twenty-six specimens from Florida, West Indies, and Brazil, which correspond very well with A. Milne Edwards's description and figure of *Eurypanopeus parvulus*. They are also well described by S. I. Smith under the name of *Panopeus politus*.

Seventh segment of male sternum not exposed. Anchylosed segment concave throughout its length, except that the proximal end is angular. Penultimate segment widest at its distal end, outline concave. Terminal segment short and rounded.

Length of carapace in large specimen, 12 millimetres; width, 18 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Key West, Florida; Dr. H. Allen (Yale Univ. Mus.); H. Hemphill, 1885 (15787).

San Domingo; W. M. Gabb, 1878 (3202).

Sabanilla, U. S. C.; U. S. Fish Commission, 1884 (15788).

Trinidad; U. S. Fish Commission, 1884 (15658).

Rio Vermelho, Bahia, Brazil; R. Rathbun, Hartt Explorations, 1875-'76.

13. *Panopeus planus* Smith.

(Plate XXIV, figs. 10 and 11.)

*Panopeus planus*. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 283, 1869. W. N. Lockington, Proc. Cal. Acad. Sci., VII, p. 102, 1876.*Eurypanopeus planus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 321, pl. LIX, fig. 4, 1880.

Carapace slightly convex longitudinally, nearly straight transversely. Areolations well defined. Anterior margin coarsely granulate, the granules thrown up in transverse lines or rugæ on the carapace. Posterior and central portions of carapace nearly smooth or glabrous to the naked eye. From the median notch of the front a deep groove extends back to the mesogastric region. There is also a deep groove running from the orbit back to the cardiac region, inclosing the gastric regions. Between the second and third antero-lateral teeth a deep groove runs back between the hepatic and the branchial regions and ends abruptly in a shallow pit. Between the last two teeth a groove of the same character runs back, but not so far. The groove between the coalesced and the second tooth ends abruptly at the base of the teeth.

External lobes of the front produced and prominent. Median lobes divided by a V-shaped notch, and produced but very little beyond the lateral lobes. Edge of the front thickened and granulate; granules rather large.

Coalesced tooth very wide, with nearly straight margin. Direction of the margin almost transverse; angle of the orbit very little produced. Third tooth a wide lobe, corners slightly rounded, the edge taking a direction nearly perpendicular to the coalesced tooth. Second tooth similar; direction of the margin intermediate between those of the first and third. Posterior tooth pointed; anterior edge very short and nearly perpendicular to the median line, posterior margin continuous with the postero-lateral margin of the carapace.

Subhepatic region very coarsely granulate, the granules extending up on the lower orbit. Tubercle prominent and spreading. Inner lower angle of the orbit triangular, much produced, and separated from the outer lobe by a wide deep sinus. External hiatus wide and rounded at the bottom.

Seventh segment of male sternum slightly exposed in some specimens. Outline of proximal end of anchylosed segment angular. Terminal segment rounded.

Carpus of the chelipeds broad, smooth to the eye, but showing fine granules under the lens. There is a very depressed spine at the inner angle, and no carpal groove. Hands large, thin, deep, pitted, and microscopically granulate. Dactyl slender, curved, in the large hand having a small cylindrical basal tooth. Tubercle sometimes present on the manns, near the articulation with the dactyl. Immovable finger triangular, color running up on the palm and behind the gape, much as in *depressus*. Fingers hooked at the tips.

Length of carapace in large specimen, 16.5 millimetres; width, 26.5 millimetres.

The specimens examined are from the Bay of Panama, F. H. Bradley (Yale Univ. Mus.).

#### 14. *Panopeus planissimus* Stimpson.

(Plate XXI, fig. 5; plate XXIV, figs. 1 and 2.)

*Xantho planissima*. W. Stimpson, Ann. Lye. Nat. Hist. N. Y., vii, p. 205, 1860.

*Panopeus planissimus*. W. Stimpson, Ann. Lye. Nat. Hist. N. Y., x, p. 103, 1871.

*Eurypanopeus planissimus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 322, 1880.

Carapace flat; posterior two-thirds smooth and glabrous; anterior finely granulate and slightly rugose.

Median lobes of front separated by a V-shaped notch, produced and somewhat rounded. Lateral lobes little produced, rounded. Edge of front thick and finely granulate, in some of the smaller dried specimens appearing double.

Coalesced tooth broadly emarginate; at the inner angle of the orbit



produced and angular; posterior portion rounded. Second tooth an oblong lobe. Third tooth pointed; posterior margin about twice as long as the anterior. Fourth tooth short; posterior margin continuous with the postero-lateral margin of the carapace. Granules on the margin of the teeth very small and inconspicuous.

Subhepatic regions finely granulate. Tubercle prominent.

Seventh segment of male sternum not exposed. General outline of distal half of abdomen nearly straight. Proximal end of anchylosed segment angular.

Carpus broad. Tooth at the inner angle very small. Groove at the outer margin deep and channeled, and a second groove at right angles to the first runs back on the carpus, forming two tubercles on a line with the upper margin of the hand. Hands rather thin and deep. Dactyl of the large hand very slender, with a white, cylindrical tooth at its base. Tubercle on the manus at the base of the dactyl. Fingers brown, lighter at the tips, color running up on the hand in the larger specimens.

The carpal groove in connection with the flat carapace, the antero-lateral teeth without prominent granules, and the emarginate post-ocular tooth, distinguishes this species readily from *planus*.

Length of carapace in large specimen, 8.5 millimetres; width, 12 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

La Paz Harbor, Lower California; L. Belding (4629); U. S. Fish Commission, 1889 (16025).

#### 15. *Panopeus serratus* Saussure.

(Plate XXIV, figs. 3 and 4.)

*Panopeus serratus*. H. de Saussure, Rev. et Mag. de Zool. (2), 9, p. 502, 1857; Mém. Soc. Phys. Genève, XIV, p. 432, pl. 1, fig. 7, 1857. W. S[timpson], Amer. Jour. Sci. (2), 27, p. 446, 1859. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 280, 1869. E. v. Martens, Arch. für Natur., 33, p. 90, 1872. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, 1, p. 311, 1880; Bull. Mus. Comp. Zool., VIII, p. 13, 1880. *Panopeus herbstii* var. *serratus*. E. J. Miers, Challenger Rept., Zool., XVII, p. 129, 1886.

To this species have been doubtfully referred two small specimens, a male from No Name Key, Florida (15664), and a female from Dry Tortugas (?), Florida (15663).

Carapace convex, with rather well-marked areolets. Front very little produced, nearly straight, thin, with a line of granules on the edge, giving it a minutely denticulate appearance. Antero-lateral teeth sharp, the posterior three hooked forward. Sinus between the external angle of the orbit and the first tooth deep. External hiatus of orbit a large V-shaped opening. Subhepatic tubercle small but well defined. Abdomen much like that of *occidentalis*. Seventh segment of sternum exposed. Coxæ of fifth pair of feet in contact with third abdominal segment.

Carpus and hand coarsely and densely granulate, rugose above. Carpal spine sharp, pointing forward. Fingers not gaping. Large tooth at the base of the dactyl on the large hand, and a tooth on the hand at the base of the dactyl.

Length of carapace, 7 millimetres; width, 8 millimetres.

16. *Panopeus harttii* Smith.

(Plate XX, fig. 1; plate XXIV, fig. 5.)

*Panopeus Harttii.* S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 280, 1869; Trans. Conn. Acad., II, pp. 5, 34, pl. 1, fig. 5, 1869; Amer. Jour. Sci. (2), 48, p. 339, 1869. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, 1, p. 314, 1880.

Second segment of male abdomen broadest at its proximal end; sides deeply concave. Seventh segment of sternum well exposed. Coxæ of fifth pair of feet in contact with third segment of abdomen. For a large portion of its length the outline of the abdomen is nearly straight.

Length of carapace in large specimen, 15 millimetres; width, 22 millimetres.

A young female from St. Thomas is doubtfully referred to this species.

RECORD OF SPECIMENS EXAMINED.

Florida: Indian Key; H. Hemphill (15647).

St. Thomas; Hartt Explorations, 1870 (Yale Univ. Mus.).

Brazil: Hartt Explorations, 1875-1876: Pernambuco; Rio Formosa, Pernambuco; Plataforma, Bahia; Abrolhos Islands.

17. *Panopeus wurdemannii* Gibbes.

(Plate XXIV, figs. 6 and 7.)

*Panopeus Wurdemannii.* Lewis R. Gibbes, Proc. Amer. Assoc. Adv. Sci., 3, p. 176, 1850. Joseph Leidy, Jour. Acad. Nat. Sci. Phila. (2), III, p. 17, 1855.

There is in the National Museum a specimen labeled "*Panopeus Wurdemannii*." It agrees with Gibbes's description, the principal characters of which are as follows:

It most nearly resembles *P. Herbstii*. The anterior edge of the front is marked by a groove whose borders are formed by finely granulated ridges. The surface of shell also is marked by a few distinct transverse ridges; the finger and thumb are white.

We have found several other specimens which agree with the first, and still others which agree in everything but the white fingers.

General appearance much like *herbstii*, but the coalesced tooth has the sinus more shallow and the rounded posterior portion longer; no conspicuous pubescence.

A character common to all the specimens is a short second segment of the male abdomen, exposing broadly the seventh segment of the sternum. Proximal end of third abdominal segment but little produced laterally; outline rounded.

In some specimens the condyle of the coxæ of the fifth pair of feet

separates the sixth and seventh segments of the sternum and comes in contact with the anchylosed segment of the abdomen. In other specimens the coxæ are entirely separated from the anchylosed segment.

Carpi and hands coarsely granulate, not rugose. Carpal groove well marked. Both hands have the double crest above. Fingers of larger specimens white, in the smaller ranging from very dark to very light, with nearly the distal half white. Tooth on the dactyl sometimes wanting.

In some instances the ambulatory feet are banded with color, and there is a large purple spot on the gastric and a smaller one on the cardiac region.

Two specimens collected by Mr. R. Rathbun at Bom Fim, Bahia, Brazil, have been doubtfully referred to this species. The carpi and hands are slightly rugose, but the general appearance is that of *wurdemannii*.

Length of carapace, 5.5 millimetres; width, 7 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

Florida: Garden Key, Dry Tortugas (3217); Marco (15667); Sarasota Bay (15666); Goodland Point (15665).

Bom Fim, Bahia, Brazil; R. Rathbun, Hartt Explorations, 1875-1876.

#### 18. *Panopeus angustifrons*, sp. nov.

(Plate XXII, fig. 3; plate XXIV, fig. 18.)

Carapace convex; areolations fairly well marked. In many specimens a slight ridge runs from the base of the last antero-lateral tooth to the gastric lobes.

Front very narrow, much produced, divided into four lobes, the middle lobes separated by a prominent V-shaped notch. From the notch the margin curves backward to the lateral lobes which are small and inconspicuous.

Orbits with two fissures above; the space between the fissures rounded and produced.

Antero-lateral edge thin and upturned. In the coalesced tooth the sinus is shallower in the adult than in the young; the orbital angle is sharp, posterior angle rounded. Second tooth broad; anterior edge running nearly perpendicular to the median line of the carapace. Posterior edge much longer than the anterior and cut obliquely backwards and outwards from the tip. In the third tooth the anterior and posterior margins are more nearly equal; the posterior, however, a little the longer. Posterior tooth shorter, sharper, and less prominent than the others. The teeth are separated by narrow deep cuts.

Inner lower angle of the orbit pointed, conical, and produced much beyond the inner upper angle. External fissure usually deep, closed at the bottom, widely spreading at the opening. Hepatic tubercle wanting. The pterygostomial region is much swollen. The maxillipeds are quadrate, their external anterior angles rounded.



In the male abdomen the third, fourth, and fifth normal segments are anchylosed, but between these segments on each side there is a short deep groove, making a superficial division (Pl. XXIV, fig. 18). Third normal segment nearly as wide as the first, its sides very much rounded, while the sides of the fourth and fifth normal segments are concave. Seventh segment of the sternum much exposed, cutting off the coxæ of the fifth pair of feet from contact with the third abdominal segment, and the male verges pass through a closed, or in some specimens a nearly closed, canal.

Meros of the chelipeds short and deep. On its upper margin is a short tooth pointing forwards; behind this tooth the margin is ordinarily straight for some distance, this straight part ending sometimes in an obtuse angle, sometimes in a small tooth. Carpal groove deep. Tooth at the inner angle of the carpus subcylindrical and obtuse. In most specimens there is also a flattened tubercle on the carpus in a line with the superior margin of the hand. Large hand smooth, deep and swollen; fingers conspicuously gaping, with a prominent cylindrical tooth near the base of the dactyl; also a tooth on the hand at the base of the dactyl. Fingers of each hand strongly hooked at the tips. The color of the fingers varies from black to dark brown, does not extend up on the hand, and is lighter at the tips. Ambulatory feet slender, dactyls long and hairy.

Length of carapace in large specimen, 19.5 millimetres; width, 28 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

Vineyard Sound, Massachusetts (15639).

Buzzard's Bay, 8 fathoms (15638).

Narragansett Bay, Rhode Island, 12½ fathoms (5769).

Long Island Sound on oyster grounds; U. S. Fish Commission, 1890; Off Milford, Stratford, Bridgeport, and Norwalk, Connecticut.

Hampton Roads, Virginia, 11 to 12 fathoms (15641).

Fort Macon, North Carolina (Yale Univ. Mus.).

South Carolina; U. S. Fish Commission, 1890-1891: Near Port Royal (15728); one mile inside of May River (15732); west end of Skull Creek (15739); mouth of Bull Creek (15723); Calibogue Sound (15774).

Florida: Marco (15642); Punta Rassa (15643); Charlotte Harbor (15644); Sarasota Bay (15645).

Vigia, Brazil; Derby and Powers, Hartt Explorations, 1870 (Yale Univ. Mus.).

From the last-named locality there is but a single small specimen with claws detached, which apparently belongs to this species.

#### 19. *Panopeus hemphilli*, sp. nov.

(Plate XXIV, figs. 12 and 13.)

Carapace somewhat hexagonal, widest at its third antero-lateral teeth. Areolations fairly well marked. On each of the frontal lobes there is a patch of granules. From the base of the depression between the second and third antero-lateral teeth there is a broken line of

granules extending across the carapace. On the gastric areolations these granules are bunched.

Front produced, faintly four-lobed and divided in the middle by a deep, narrow notch, the outer angles of which are ordinarily rather sharp. Median lobes curve backwards to the much-flattened and inconspicuous lateral lobes. On the margin of the front there is a single row of granules which give it a denticulate appearance. These granules extend around the antero-lateral margin, where they are less conspicuous than on the front.

Upper portion of the orbit with two sutures more or less open. Coalesced tooth divided part way to its base by a broad sinus, anterior angle sharp, posterior rounded. Anterior edge of second normal tooth straight, outer edge truncate, rounding gradually backward to the sinus. Third normal tooth slightly hooked forward. A bunch of granules begins on the point and widens out till it occupies the whole raised surface of the tooth. Anterior and posterior margins of fourth tooth very nearly alike, the anterior very slightly concave. The points of the coalesced tooth and the point of the second tooth are in a straight line, and nearly in line with the internal angle of the orbit, giving the carapace a hexagonal appearance. The cuts between the teeth are rounded at the base, and the whole anterior base of the third tooth is hollowed out forming a pit which runs back under the ridge of the tooth.

External hiatus of the orbit V-shaped. Subhepatic tooth very slight.

Outline of male abdomen concave. Second segment short, sides straight, nearly parallel. Seventh sternal segment showing broadly; coxæ of fifth pair of feet altogether cut off from contact with third abdominal segment. Penultimate segment broadest at its distal end, sides straight. Terminal segment triangular, as long as broad.

Meros of chelipeds longer than usual in the genus. Carpus and upper portion of hand thickly covered with large granules. Carpus rugose, carpal depression present. Upper margin of hand surmounted by two ridges. Large hand deep and strong. Small hand with the fingers much deflexed. Dactyl of large cheliped with a cylindrical tooth, which is, however, occasionally wanting, and a tooth on the manus at the base of the dactyl. Prehensile edge of the fingers dentate. Color of the fingers clear white, in the large hand extending nearly to the gape of the claw. Ambulatory feet slender, dactyls hairy.

This species is very distinct from any others that we have examined, and is easily distinguished by its denticulate front in connection with the dentation of the antero-lateral margin, and the white fingers with cylindrical basal tooth.

Length of carapace in large specimen, 6.5 millimetres; width, 9.5 millimetres.

#### RECORD OF SPECIMENS EXAMINED.

Florida: Key Largo (15648); Indian Key (15649); No Name Key (15650); Key West Harbor (15651); Key West (15652); ? Dry Tortugas (15653).

20. *Panopeus bermudensis*, sp. nov.

(Plate xx, fig. 2; plate xxiv, figs. 14 and 15.)

Carapace distinctly areolated, posteriorly as well as anteriorly. Areolations ornamented with transverse lines and occasional small clusters of granules.

Front much produced, rather deeply cleft in the center, the cleft rounding out into the median lobes which are produced at this point. Outer angles of the front not produced in some specimens, and slightly in others. Edge of front oblique, thickened, densely granulate, and showing a slight marginal groove. There are two fissures on the upper orbital margin.

First and second teeth of the antero-lateral margin flat and thin; third and fourth thickened, with anterior margins concave and hollowed. The sulcus of the coalesced tooth varies greatly with the specimen. Second tooth the largest, separated from the first by a wide and deep notch; anterior margin straight, pointing slightly forward and not at all hooked; posterior angle nearly straight anteriorly, but rounding backward to the broad and deep notch which separates it from the third tooth. In most specimens the anterior margin of the third tooth is concave. The tooth is much narrower than the second, and its posterior margin curves gradually backward to the bottom of the notch. Fourth tooth much the smallest, sharp pointed, and directed nearly perpendicular to the median line. The depressions between these teeth unite with the depressions between the areolets.

External hiatus of orbit widely V-shaped. Internal angle of lower margin produced into a rather sharp tooth. Remainder of margin not produced in a flattened, rounded tooth, but nearly straight. There is a slight swelling instead of a hepatic tubercle.

Outline of male abdomen slightly concave. First and third segments comparatively narrow and of about equal width. Second segment much narrower, showing the sternal plates. Coxæ of fifth pair of feet not in contact with anchylosed segment. Outline of third normal segment very convex or rounded, of fourth normal very concave, and of fifth normal nearly straight. Penultimate and terminal segments about equal in length. Distal portion of penultimate segment slightly broader than the proximal.

Meros of chelipeds very deep, having a quadrate appearance, and carrying an obtuse tooth on its upper margin. Carpi, chelipeds, and bases of the dactyls finely granulate. Carpal depression well defined along the margin, and extending around to the tooth on the inner angle. Large cheliped very deep and rather thick. Fingers light brown, in some specimens white. Ambulatory feet slender; dactyls very slender and hairy.

The antero-lateral teeth are somewhat like those of *areolatus*, which, however, is separated from *bermudensis* by other strongly marked characters.



Length of carapace in large specimen, 9 millimetres; width, 12 millimetres.

The specimens examined were collected in the Bermudas by Mr. G. Brown Goode, 1876-'77.

21. *Panopeus affinis* Streets and Kingsley.

*Panopeus transversus*. W. N. Lockington, Proc. Cal. Acad. Sci., VII, p. 102, 1876 (non Stimpson).

*Panopeus affinis*. Streets and Kingsley, Bull. Essex Inst., IX, p. 106, 1877. J. S. Kingsley, Proc. Boston Soc. Nat. Hist., XX, p. 151, 1879.

*Eurytium affine*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 334, pl. LX, fig. 1, 1880. E. J. Miers, Challenger Rept., Zoöl., XVII, p. 140, 1886.

Carapace much flattened, front two-lobed, inner and outer angles of lobes evenly rounded. Front and antero-lateral margins, especially the hepatic regions, granulate. External angle of orbit sharp, separated from the first antero-lateral tooth by a scarcely perceptible sinus, second tooth lobate, third tooth broadly triangular, last tooth very small and obtuse. Male abdomen comparatively broad, and tapering from the middle of anchylosed segment to the tip. Sixth and seventh sternal plates nearly in contact. Large cheliped with a small tooth at the base of the dactyl, and also one on the manus. Ambulatory feet sparsely set with long hairs.

Length of carapace in large specimen, 12.7 millimetres; width, 18 millimetres.

RECORD OF SPECIMENS EXAMINED.

Gulf of California; U. S. Fish Commission, 1889: San Luis Gonzales Bay, Lower California (16027); Puerto Refugio, Angel Island (16026).

22. *Panopeus crenatus* Edwards and Lucas.

(Plate XXI, fig. 4; plate XXIV, fig. 17.)

*Panopeus crenatus*. Milne Edwards and Lucas, D'Orbigny's Voy. l'Amér. Mérid., p. 16, pl. VIII, fig. 1, 1843. Adam White, Crust. in Brit. Mus., p. 18, 1847. James D. Dana, Crust. U. S. Ex. Ex., p. 181, 1852. Spence Bate, Nat. in Brit. Columbia, II, p. 270, 1866. S. I. Smith, Trans. Conn. Acad., II, p. 5, 1869; Rept. Geol. Sur. Canada for 1878-'79 (1880), p. 209 B.

*Eurypanopeus crenatus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 318, 1880.

?*Eurypanopeus peruvianus*. A. Milne Edwards, *Loc. cit.*, pl. LX, fig. 3.

Larger than *transversus*, with a more prominent front, and readily distinguished from the latter and from all other species of *Panopeus* that we have examined, by the short second segment of the abdomen, in connection with the lobate antero-lateral margin.

The seventh segment of the male sternum is so exposed and dilated toward the sixth that the verges pass through an entirely closed channel. In the anchylosed segment, the sides of the third normal segment are very much rounded, those of the fourth normal are straight, and of the fifth normal convex. Sides of penultimate straight and parallel. Terminal segment much broader than long.

Length of carapace in large specimen, 19 millimetres; width, 27 millimetres.

The specimens examined are from Callao, Peru; F. H. Bradley (Yale Univ. Mus.).

23. *Panopeus harrisii* (Gould).

(Plate XXI, fig. 2; plate XXIV, fig. 16.)

*Pilumnus harrisii*. A. A. Gould, Invert. of Mass., p. 326, 1841.

*Panopeus harrisii*. W. Stimpson, Ann. Lyc. Nat. Hist., VII, p. 55, 1859. S. I. Smith, Rept. Commr. of Fisheries for 1871 and 1872 (1874), pp. 547, 313; Trans. Conn. Acad., v, p. 37, 1879. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 319, 1878. A. E. Verrill, Check-List of Marine Invert., p. 1, 1879. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 312, pl. LVIII, fig. 3, 1880; Bull. Mus. Comp. Zool., VIII, p. 13, 1880. R. Rathbun, Fishery Industries of U. S., section I, p. 772, 1884. Carl F. Gissler, Amer. Nat., XVIII, p. 225, 1884.

Carapace convex longitudinally, much less convex transversely; wider posteriorly than the other species of the genus, giving it more of a quadrilateral appearance. There are two transverse lines of granules on the gastric region, a line extending from the posterior tooth to the gastric region, and a line on the mesogastric.

Front very little produced, nearly straight, channeled on its forward edge, giving it a double appearance; upper and lower margins granulate; median notch triangular.

Antero-lateral teeth not prominent. Coalesced tooth inconspicuous, flattened. Second and third teeth point obliquely forward. Last tooth small.

External hiatus of orbit a very slight, nearly closed fissure. Subhepatic tubercle wanting.

Second segment of male abdomen short, much broader at its distal end, sides nearly straight. Seventh sternal plate exposed, in contact with the sixth, covering the verges. Abdomen much constricted at the articulation of the anelylosed and penultimate segments. Terminal segment about as long as broad. Distal end flattened, giving it a subrectangular shape.

Distal edge of carpus bordered by a line of granules. Lines and bunches of granules are scattered over the upper surface. Carpal groove prominent. Hands and fingers white, with no large tooth at the base of the dactyl and none on the manus. The two ridges on the upper edge of the hand are granulate, and there are granules also on the upper edge of the fingers. Fingers slender, their prehensile edges evenly dentate. Ambulatory feet long, slender, and compressed.

Some of the specimens from the region of Winyah Bay, South Carolina, were found in streams where the water was entirely fresh.

Length of carapace in large specimen, 11 millimetres; width, 14.5 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Beesley's Point, New Jersey (Yale Univ. Mus.).

Potomac River (3176).

Near Winyah Bay, South Carolina; U. S. Fish Commission, 1890-'91.

St. John's River, Florida (Yale Univ. Mus.).

Mouth of Indian River, Florida (Yale Univ. Mus.).

24. *Panopeus limosus* (Say).

*Cancer limosa*. Thomas Say, Jour. Acad. Nat. Sci. Phila., I, p. 446, 1817.

*Panopeus limosus*. Milne Edwards, Hist. Nat. des Crust., I, p. 404, 1834. J. E. De Kay, Crust. of N. Y., p. 5, 1844. Adam White, Crust. in Brit. Mus., p. 18, 1847. Lewis R. Gibbes, Proc. Acad. Nat. Sci. Phila., v, p. 23, 1850; Proc. Amer. Assoc. Adv. Sci., III, p. 176, 1850. H. Lucas, Hist. Nat. des Crust., p. 90, 1851. E. v. Martens, Arch. für Natur., 38, p. 91, 1872.

*Eurytium limosum*. W. Stimpson, Ann. Lye. Nat. Hist., VII, p. 56, 1859. J. S. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 319, 1878; xxxi, p. 394, 1879. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 332, pl. LX, fig. 2, 1880. E. J. Miers, Challenger Rept., Zool., XVII, p. 141, 1886.

Numerous specimens of this well-known crab were found in the marshy banks, a little below high-tide mark, in burrows partially filled with water. In the fresh state they are readily recognized and separated from all other crabs by the color. Carapace, a brilliant purplish blue; carpus and hand, bluish; proximal upper half of the dactyls of chelipeds, pink; remainder of fingers, porcelain white; lower portion of chelipeds and carpal tooth, orange-yellow.

Carapace very convex longitudinally, nearly straight transversely. Front much deflexed, composed of two lobes, the inner and outer angles alike and evenly rounded. A slight emargination in the coalesced tooth. Second tooth semi-lobate; third and fourth short, pointed, triangular.

Carpal groove wanting. Fingers evenly dentate. In the larger cheliped there is a slight tooth on the dactyl, and also one on the manus.

Appendages of male abdomen very much like those of *herbstii*, with the *obesus* type of which it is associated, burrowing in the same bank.

Length of carapace, 28 millimetres; width, 42.5 millimetres.

## RECORD OF SPECIMENS EXAMINED.

Port Royal Island, South Carolina; U. S. Fish Commission, 1891 (16025).

Key West, Florida (9899, 13824).

Curaçao; U. S. Fish Commission, 1884 (7579).

Plataforma, Bahia, Brazil; R. Rathbun, Hartt Explorations, 1875-'76.

## SPECIES NOT EXAMINED.

1. *Panopeus chilensis* Edwards and Lucas.

*Panopeus chilensis*. Milne Edwards and Lucas, D'Orbigny's Voy. l'Amér. Mérid., p. 16, pl. VIII, fig. 2, 1843. Gay, Historia de Chile, Zool., 3, p. 139, 1849. S. I. Smith, Proc. Boston Soc. Nat. Hist. XII, p. 279, 1869. T. H. Streets, Proc. Acad. Nat. Sci. Phila., (3), I, p. 239, 1871. W. N. Lockington, Proc. Cal. Acad. Sci., VII, p. 103, 1876. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 315, 1880.



Carapace convex, areolated. Front produced, narrower than in *herbstii*. Antero-lateral teeth triangular, the last three pairs with points directed forward.

This species and *P. validus* Smith are very closely related, but our specimens of the latter differ from the figure of *chilensis* given by Edwards and Lucas, in the deep but closed median cleft of the front, in the broader bases of the antero-lateral teeth, in the deeper sulcus of the coalesced tooth, and the stouter ambulatory feet. The front of *chilensis* is nearly straight, while in *validus* the lateral lobes are produced and prominent. The fingers also of *chilensis* are not channeled.

Length, 26 millimetres; width, 38 millimetres.

Chili; Panama; west coast of Mexico.

## 2. *Panopeus subverrucosus* (White).

*Ozius? subverrucosus*. Adam White, Crust. in Brit. Mus., p. 19, 1847; Proc. Zool. Soc. London, xv, p. 226, 1847.

*Panopeus subverrucosus*. E. J. Miers, Challenger Rept., Zool., xvii, p. 129, 1886.

Carapace with latero-anterior side short, with three deep incisions forming four lobes, the two middle truncated; carapace above irregular, the edges and under-side thickly covered with small warts. Front formed of two truncated widish lobes, separated by a very slight notch; a deepish notch between the front and the orbit, and a sinus between the outer orbital angle and the first lobe of the side. Hab. — ?

This species is represented in the British Museum by a carapace only.

## 3. *Panopeus lævis* Dana.

*Panopeus lævis*. J. D. Dana, Crust. U. S. Ex. Ex., I, p. 180, 1852.

"? *Panopeus lævis*." E. J. Miers, Challenger Rept., Zool., xvii, p. 129, 1886.

Carapace smooth, scarcely shining, not distinctly areolate, front nearly straight, not produced, minutely emarginate, antero-lateral margin thin, four-lobed, second and third lobes neatly dentiform and acute, the posterior margin of these teeth arcuate, fourth narrower. Anterior feet very unequal, unarmed, rounded above, hand smooth, a little shining on outside, movable finger smooth, without a large basal tooth. Eight posterior feet slender, margins pubescent, third joint nearly naked.

Locality doubtful.

The figure as given by Dana represents a species very distinct from any that we have examined.

## 4. *Panopeus americanus* Saussure.

*Panopeus americanus*. H. de Saussure, Rev. et Mag. de Zool., (2), 9, p. 502, 1857; Mém. Soc. Phys. Genève, xiv, p. 432, pl. 1, fig. 8, 1857. W. S[timpson]. Amer. Jour. Sci. (2), 27, p. 446, 1859. E. v. Martens, Arch. für Natur., 38, p. 90, 1872. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 311, 1880.

Small; carapace flat, more quadrate than *serratus*; margins lobate. Saussure, in his description and figure, represents this species with

lobate teeth, which, in connection with the proportionately greater length of the carapace, readily distinguishes it from any other species.

West Indies.

#### 5. *Panopeus abbreviatus* Stimpson.

*Panopeus abbreviatus*. W. Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, p. 211, 1860.

*Eurypanopeus abbreviatus*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 320, pl. LIX, fig. 3, 1881.

Carapace broad, transversely rugose; regions well defined, but not protuberant; front rather narrow and but little projecting; margin seen from above nearly straight and obliquely truncated or beveled, the beveled surface being granulated; supra-orbital fissure distinct; antero-lateral teeth normal in number and rather prominent; subhepatic regions granulated; a slight tuberculiform prominence beneath the first antero-lateral tooth; chelipeds smooth; surface microscopically punctated.

Barbados.

Edwards's figure shows the front broad, the antero-lateral margin lobate, the fourth tooth scarcely perceptible. The appearance of the carpus is something like that of *ovatus* from Lower California.

#### 6. *Panopeus africanus* A. Milne Edwards.

*Panopeus africanus*. A. Milne Edwards, Ann. Soc. Entom. France (4), 7, p. 276, 1867; Miss. Sci. au Mexique, pt. 5, I, p. 308, 1880. E. J. Miers, Challenger Rept., Zool., XVII, p. 129, 1886.

A. Milne Edwards says of this species that it is much like *chilensis*, but the front is less advanced, the carapace more granulate, the antero-lateral teeth are directed more outward and less forward, and lastly, the feet are much more pubescent than in *chilensis*.

West coast of Africa.

#### 7. *Panopeus bradleyi* Smith.

*Panopeus Bradleyi*. S. I. Smith, Proc. Boston Soc. Nat. Hist., XII, p. 231, 1869. W. N. Lockington, Proc. Cal. Acad. Sci., VII, p. 102, 1876. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 317, 1880.

Carapace transversely flat, longitudinally convex; areolations well marked. Antero-lateral teeth upturned; front slightly prominent, nearly horizontal, edge thin; sinus of coalesced tooth rounded; remaining teeth rather prominent, triangular, thickened along the anterior edge. Chelipeds with carpi rugose externally. Larger hand stout, fingers short, widely gaping, irregularly toothed within, and with a stout tooth at the base of each finger, the one on the dactyl shutting just within the other.

Length of carapace in the male, 8.4 millimetres; breadth, 11.5 millimetres.

Panama.

8. *Panopeus purpureus* Lockington.\*

*Panopeus purpureus*. W. N. Lockington, Proc. Cal. Acad. Sci., VII, p. 101, 1876. Streets and Kingsley, Bull. Essex Inst., IX, p. 105, 1877. J. S. Kingsley, Proc. Boston Soc. Nat. Hist., XX, p. 152, 1879. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 316, pl. LVII, fig. 3, 1880.

Kingsley says of this species:

This form is very near *P. validus* Smith, and probably will prove to be merely a variety of it. In comparison with Smith's description and with authentic specimens of *P. validus* brought from the Gulf of Fonseca, by J. A. McNeil, it presents the following differences: Carapace smoother, and the granulous rugæ less numerous; front less prominent, and, seen from above, nearly straight; fissures of the orbit less evident; tooth at inner angle of orbit below broader and shorter, second normal tooth of antero-lateral margin separated from the angle of the orbit by a narrower, more triangular notch; notches between the remaining teeth narrower, the teeth themselves having a distinct elevated margin. Propodus of chelipeds with an obtuse crest above; the tooth on the outer surface of larger hand nearly obsolete, dactylus with a large basal tooth. Ambulatory feet less compressed than in *P. validus*.

Lower California; west coast of Nicaragua.

This species appears to us to be nearer to *chilensis* than to *validus*.

9. *Panopeus xanthiformis* A. Milne Edwards.

*Panopeus xanthiformis*. A. Milne Edwards, Miss. Sci. au Mexique, pt. 5, I, p. 353, pl. LIII, fig. 4, 1880; Bull. Mus. Comp. Zool., VIII, p. 13, 1880. E. J. Miers, Challenger Rept., Zool., XVII, p. 129, 1886.

Resembles *Xanthodes*. Carapace flattened, granulated on the antero-lateral borders. Front composed of two lobes; median fissure narrow. Orbit wide; inferior border crenulate. First antero-lateral tooth small,

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\*Since this paper has been in type, several specimens of *purpureus*, from Guaymas, Mexico, have been presented to the National Museum by Mr. P. L. Jouy. The following description is based on these specimens:

Carapace convex in both directions, finely granulate, marked on the anterior half by transverse granulous rugæ. Front nearly straight, faintly four-lobed. Coalesced tooth with shallow, rounded sinus. Remaining teeth much as in *herbstii*, not strongly hooked nor separated by broad sinuses as in *validus*. Suborbital margin three-lobed. External hiatus deep and narrowly V-shaped. Subhepatic tubercle prominent.

Proximal end of second segment of male abdomen much wider than the distal end, prolonged laterally in an obtuse lobe. Outline of last three segments resembling that of *herbstii*. Seventh segment of sternum slightly exposed.

Chelipeds granulate. Carpus broad, finely rugose; tooth at inner angle sharp, groove present. Hands short, deep, with a double crest above. Dactyl of large hand with a stout tooth; a broad tooth on the hand at the base of the dactyl. Dactyls of third and fourth ambulatory feet much longer than in *validus*.

Color of carapace, dark, bluish brown; upper surface of chelipeds, lighter violet brown; both carapace and chelipeds spotted with irregular blotches of dark reddish brown. Under surface of chelipeds, orange yellow. Fingers light brown, white at the tips.

This species is very distinct from *validus*, and is well figured by A. Milne Edwards. Length, 25.5 millimetres; width, 37 millimetres.

Guaymas, Mexico; P. L. Jouy, 1891 (16080).



rounded; second and third large; last tooth small and pointed. Chelipeds finely granulated and rugose.

Length, 9 millimetres; width, 13 millimetres.

West Indies, 73 to 118 fathoms.

10. *Panopeus herbstii granulatus* A. Milne Edwards.

Miss. Sci. au Mexique, pt. 5, 1, p. 309, 1880.

Variety of *herbstii* found at Bahia, Brazil, and remarkable for its wide and very granulate carapace.

11. *Panopeus crassus* A. Milne Edwards.

*Loc. cit.*, p. 313, pl. LVII, fig. 1.

Distinguished from *herbstii* by its wider carapace, less convex transversely, and much swollen mesogastric region. Antero-lateral portion finely granulated. Front much produced, horizontal. External angles sharp, and produced much in advance of the orbital angles. Chelipeds very strong.

Length, 36 millimetres; width, 65 millimetres.

Brazil.

12. *Panopeus rugosus* A. Milne Edwards.

*Loc. cit.*, p. 314, pl. LVII, fig. 4.

Carapace very wide and granulate. Epigastric, protogastric, and protobranchial regions with prominent transverse lines. Front with triangular median notch, not a straight fissure, as in *herbstii* and *crassus*. Front four-lobed, median lobes rounded and produced, lateral lobes nearly straight. External angle of orbit little advanced and separated from the first antero-lateral tooth by a slight sinus. All the teeth are bordered by a line of granules. Chelipeds covered with fine granules. Hands with two prominent longitudinal lines above. Ambulatory feet long, dactyls slender.

Species easily distinguished by the form of the front, by the antero-lateral teeth, by the granulation of the carapace and chelipeds, and by the length of the ambulatory feet.

Length, 39 millimetres; width, 60 millimetres.

Bahia, Brazil.

13. *Panopeus convexus* A. Milne Edwards.

*Loc. cit.*, p. 316, pl. LVIII, fig. 5.

Edwards says of this species:

Carapace very convex in both directions. Areolations prominent; nearly smooth. Front less advanced than in *chilensis*, more depressed, lateral angle less conspicuous. External orbital angle not produced, scarcely separated from the first antero-lateral tooth. (Fig. 5, *loc. cit.*, represents it as deeply separated.)

Length, 25 millimetres; width, 36 millimetres.

Chili.

14. *Panopeus otagoensis* H. Filhol.

Rec. Vénus, III, (p. 379), 1886.

Campbell Island, South Pacific.

15. *Panopeus latifrons* J. G. de Man.

Arch. für Natur., I, p. 265, pl. IX, fig. 4, 1887.

Length, 4.8 millimetres; breadth, 7.2 millimetres.

Amboina.

This species will doubtless be eventually referred to some other genus. The figure is hardly that of a *Panopeus*.

EXPLANATION OF PLATES.

(Plates XIX-XXII from photographs by Mr. T. W. Smillie; plates XXIII and XXIV drawn by Dr. J. C. McConnell.)

PLATE XIX.

- Fig. 1. *Panopeus herbstii* Edw.  
 2. *Panopeus herbstii* Edw. (obesus type).  
 3. *Panopeus validus* Smith.

Figures natural size.

PLATE XX.

- Fig. 1. *Panopeus harttii* Smith,  $\times \frac{1}{2}$ .  
 2. *Panopeus bermudensis* sp. nov.,  $\times \frac{1}{2}$ .  
 3. *Panopeus occidentalis* Saus., natural size.  
 4. *Panopeus dissimilis* sp. nov.,  $\times \frac{1}{2}$ .  
 5. *Panopeus depressus* Smith,  $\times \frac{1}{2}$ .

PLATE XXI.

- Fig. 1. *Panopeus parvulus* (Fabr.), natural size.  
 2. *Panopeus harrisii* (Gould),  $\times \frac{1}{2}$ .  
 3. *Panopeus areolatus* sp. nov., natural size.  
 4. *Panopeus crenatus* Edw. and Lucas, natural size.  
 5. *Panopeus planissimus* Stimpson,  $\times \frac{1}{2}$ .

PLATE XXII.

- Fig. 1. *Panopeus packardii* Kingsley.  
 2. *Panopeus transversus* Stimpson.  
 3. *Panopeus angustifrons* sp. nov.  
 4. *Panopeus sayi* Smith.  
 5. *Panopeus texanus* Stimpson.

Figures natural size.

PLATE XXIII.

- Fig. 1. *Panopeus dissimilis* sp. nov., male abdomen  
 2. *Panopeus parvulus* (Fabr.), male abdomen.  
 3. *Panopeus parvulus* (Fabr.), larger manus.  
 4. *Panopeus depressus* Smith, male abdomen.

- FIG. 5. *Panopeus depressus* Smith, smaller manus.  
6. *Panopeus packardii* Kingsley, male abdomen.  
7. *Panopeus sayi* Smith, larger manus.  
8. *Panopeus sayi* Smith, larger manus, with color more restricted.  
9. *Panopeus texanus* Stimpson, male abdomen.  
10. *Panopeus herbstii* Edw., larger manus.  
11. *Panopeus herbstii* (obesus type), larger manus.  
12. *Panopeus herbstii*, male abdomen.  
13. *Panopeus validus* Smith, male abdomen.  
14. *Panopeus occidentalis* Saus., male abdomen.

Figures enlarged.

PLATE XXIV.

- Fig. 1. *Panopeus planissimus* Stimp., male abdomen.  
2. *Panopeus planissimus* Stimp., larger manus.  
3. *Panopeus serratus* Saus., outline of carapace.  
4. *Panopeus serratus* Saus., male abdomen.  
5. *Panopeus harttii* Smith, male abdomen.  
6. *Panopeus wurdemannii* Gibbes, male abdomen.  
7. *Panopeus wurdemannii* Gibbes, outline of carapace.  
8. *Panopeus ovatus* sp. nov., outline of carapace.  
9. *Panopeus transversus* Stimp., male abdomen.  
10. *Panopeus planus* Smith, outline of carapace.  
11. *Panopeus planus* Smith, male abdomen.  
12. *Panopeus hemphillii* sp. nov., outline of carapace.  
13. *Panopeus hemphillii* sp. nov., male abdomen.  
14. *Panopeus bermudensis* sp. nov., male abdomen.  
15. *Panopeus bermudensis* sp. nov., larger manus.  
16. *Panopeus harrisii* (Gould), male abdomen.  
17. *Panopeus crenatus* Edw. and Lucas, male abdomen.  
18. *Panopeus angustifrons* sp. nov., male abdomen.

Figures enlarged.

Proc. N. M. 91—25